

SUB 17 allowing the heat to transfer from one or more heaters to a part of the formation such that a permeability of at least a portion of the part of the formation increases to greater than about 100 millidarcy.

2194. (amended) The method of claim 2193, wherein the one or more heaters comprise at least two heaters, and wherein controlled superposition of heat from at least two heaters pyrolyzes at least some hydrocarbons within the part of the formation.

2195. (amended) The method of claim 2193, further comprising maintaining a temperature within the part of the formation within a pyrolysis temperature range.

SUB 17
2196. (amended) The method of claim 2193, wherein at least one of the one or more heaters comprises an electrical heater.

2197. (amended) The method of claim 2193, wherein at least one of the one or more heaters comprises a surface burner.

C3
2198. (amended) The method of claim 2193, wherein at least one of the one or more heaters comprises a flameless distributed combustor.

2199. (amended) The method of claim 2193, wherein at least one of the one or more heaters comprises a natural distributed combustor.

2200. (amended) The method of claim 2193, further comprising controlling a pressure and a temperature within at least a majority of the part of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2201. (amended) The method of claim 2193, further comprising controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day during pyrolysis.

Sub E7
CB
2202. (amended) The method of claim 2193, wherein providing heat from one or more of the heaters to at least the portion of formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from one or more of the heaters, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day (P_{wr}) provided to the selected volume is equal to or less than $h \cdot V \cdot C_v \cdot \rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day.

Sub E37
2204. (amended) The method of claim 2193, wherein providing heat from one or more of the heaters comprises heating the part of the formation such that a thermal conductivity of at least a portion of the part of the formation is greater than about 0.5 W/(m °C).

E4314
2219. (amended) The method of claim 2193, further comprising controlling a pressure within at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

Sub E57
2224. (amended) The method of claim 2193, further comprising:
providing hydrogen (H_2) to the heated part of the formation to hydrogenate hydrocarbons within the part of the formation; and
heating a portion of the part of the formation with heat from hydrogenation.

Sub G17
2226. (amended) The method of claim 2193, further comprising increasing a permeability of a majority of the part of the formation to greater than about 5 Darcy.

Sub E57
CB
2227. (amended) The method of claim 2193, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the part of the formation.

2228. (amended) The method of claim 2193, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by a Fischer Assay.

2229. (amended) The method of claim 2193, further comprising producing a mixture in a production well, wherein at least about 7 heaters are disposed in the formation for each production well.

2230. (amended) The method of claim 2193, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, and wherein the unit of heaters comprises a triangular pattern.

2231. (amended) The method of claim 2193, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, wherein the unit of heaters comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2232. (amended) A method of treating a hydrocarbon containing formation in situ, comprising: providing heat from one or more heaters to at least a portion of the formation; and allowing the heat to transfer from one or more heaters to a part of the formation such that a permeability of a majority of at least a portion of the part of the formation increases and such permeability is substantially uniform.

2233. (amended) The method of claim 2232, wherein the one or more heaters comprise at least two heaters, and wherein controlled superposition of heat from at least two heaters pyrolyzes at least some hydrocarbons within the part of the formation.

SUB E 67 2234. (amended) The method of claim 2232, further comprising maintaining a temperature within the part of the formation within a pyrolysis temperature range.

SUB E 7 2235. (amended) The method of claim 2232, wherein at least one of the one or more heaters comprises an electrical heater.

2236. (amended) The method of claim 2232, wherein at least one of the one or more heaters comprises a surface burner.

2237. (amended) The method of claim 2232, wherein at least one of the one or more heaters comprises a flameless distributed combustor.

2238. (amended) The method of claim 2232, wherein at least one of the one or more heaters comprises a natural distributed combustor.

SUB E 7 2239. (amended) The method of claim 2232, further comprising controlling a pressure and a temperature within at least a majority of the part of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2240. (amended) The method of claim 2232, further comprising controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day during pyrolysis.

SUB E 7 2241. (amended) The method of claim 2232, wherein providing heat from one or more of the heaters to at least the portion of formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from one or more of the heaters, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

C6
SUB E7
wherein heating energy/day (P_{wr}) provided to the selected volume is equal to or less than $h \cdot V \cdot C_v \cdot \rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day.

SUB E8
C7
2243. (amended) The method of claim 2232, wherein providing heat from one or more of the heaters comprises heating the part of the formation such that a thermal conductivity of at least a portion of the part of the formation is greater than about 0.5 W/(m °C).

SUB F9
C8
2258. (amended) The method of claim 2232, further comprising controlling a pressure within at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

SUB F10
C9
2263. (amended) The method of claim 2232, further comprising:
providing hydrogen (H_2) to the heated part of the formation to hydrogenate hydrocarbons within the part of the formation; and
heating a portion of the part of the formation with heat from hydrogenation.

SUB E10
2265. (amended) The method of claim 2232, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the part of the formation to greater than about 100 millidarcy.

SUB G7
2266. (amended) The method of claim 2232, further comprising controlling the heat to yield greater than about 60% by weight of condensable hydrocarbons, as measured by a Fischer Assay.

C10
2267. (amended) The method of claim 2232, further comprising producing a mixture in a production well, wherein at least about 7 heaters are disposed in the formation for each production well.

Sub 617
C10
2268. (amended) The method of claim 2232, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, and wherein the unit of heaters comprises a triangular pattern.

2269. (amended) The method of claim 2232, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, wherein the unit of heaters comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

Sub 617
C11
5396. (amended) The method of claim 2229, wherein at least about 20 heaters are disposed in the formation for each production well.

5397. (amended) The method of claim 2267, wherein at least about 20 heaters are disposed in the formation for each production well.

Sub 617
Sub 617
5398. (new) The method of claim 2193, wherein the part of the formation comprises a selected section.

5399. (new) The method of claim 2193, wherein the part of the formation comprises a pyrolysis zone.

Sub 617
C12
5400. (new) The method of claim 2193, wherein at least one of the heaters is disposed in an open wellbore.

5401. (new) The method of claim 2232, wherein the part of the formation comprises a selected section.

SUB 17
5402. (new) The method of claim 2232, wherein the part of the formation comprises a pyrolysis zone.

SUB 17
5403. (new) The method of claim 2232, wherein at least one of the heaters is disposed in an open wellbore.

SUB 17
5404. (new) A method of treating a hydrocarbon containing formation in situ, comprising:
providing heat from heaters to a portion of the formation to produce heated zones adjacent to the heaters;
allowing the heat to transfer from the heated zones to form an interconnected pyrolysis zone, wherein an average temperature in the pyrolysis zone is at a temperature sufficient to pyrolyze hydrocarbons; and
allowing the heat to transfer to the pyrolysis zone from the heated zones at rates sufficient to increase a permeability of the pyrolysis zone such that the permeability in the pyrolysis zone is substantially uniform.

SUB 17
C12
5405. (new) The method of claim 5404, wherein the pyrolysis zone comprises a selected section.

5406. (new) The method of claim 5404, wherein at least one heater comprises a natural distributed combustor.

SUB 17
5407. (new) The method of claim 5404, wherein at least one heater is disposed in an open wellbore.

SUB 17
5408. (new) The method of claim 5404, further comprising producing a mixture from the pyrolysis zone, wherein the mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.